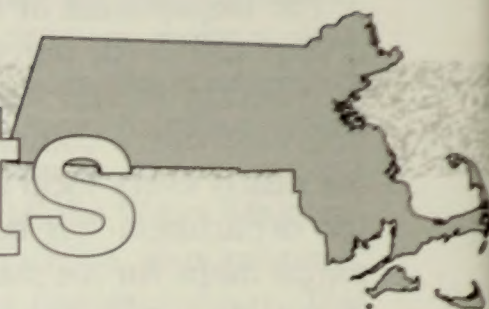# Massachusetts

The Executive Office of Environmental Affairs (EOEA) in Massachusetts operates the cabinet-wide "MassGIS" used by a variety of its environmental agencies, and other entities in the state, including regional planning agencies. MassGIS began in 1985 when a cooperative agreement was initiated between EOEA and the Water Resources Division (WRD) of the U.S. Geological Survey (USGS) to begin GIS activities for the state at the WRD office in Boston. In June 1989, EOEA purchased its own GIS software, and now manages MassGIS on facilities at the EOEA Data Center. Efforts have concentrated on development of statewide digital data and applications. EOEA has evolved to serve in a lead role in the state regarding GIS, including initiating a statewide coordination group. This group was formalized to become the Massachusetts Geographic Information Council (MGIC) administered by the state Office of Management Information Systems (OMIS) in early 1990, and is now staffed by OMIS. MGIC membership is open, and has an Executive Committee that includes MGIC elected representatives of state agencies, regional planning associations, municipalities, academia and the private sector. In addition to EOEA and its agencies, other state agencies are also using GIS and participating in MGIC.

Origins of State Initiatives

Massachusetts has an early history regarding attention to the need for modernization of land information management, and the development of GIS technology. Beginning in approximately 1970, it was one of the first states in the country to address the need for statewide land records reform. The legislature created and provided funding for the Land Records Commission in the early 1970s to analyze conditions and recommend statewide action to modernize land records and related technology use in the state. The primary goal of the commission was to encourage the move from consideration of land as a commodity to the concept of a land economy, much like how land is considered and managed in Europe. In its three years of work, the commission prepared extensive reports and recommendations to modernize con-

ditions in this regard. These reports recommended implementation of an integrated mapping system, a comprehensive parcel identification numbering system, and an evaluation of the quality of assessment maps. The commission also initiated New England regional efforts regarding modernization of land information management. The Commission presented their findings to the New England Governors' Conference in May 1975, and introduced a resolution to modernize conditions at the regional level, but the proposal was not adopted because it did not have unanimous approval. Continued funding for the commission's work was not approved by the legislature after 1976.

Researchers at academic institutions in Massachusetts were early innovators in GIS technology. Harvard University's Laboratory for Computer

Graphics was established in the Graduate School of Design in the mid-1960s. Researchers affiliated with the laboratory created SYMAP, GRID and ODYSSEY software in the late 1960s and early 1970s. Researchers at the University of Massachusetts at Amherst were also conducting related work at this time, and they developed METLAND software and a database of soils, terrain and other data for demonstration regions in the state. Both institutions had various environmental planning demonstration projects which increased awareness of emerging GIS capabilities in the public and private sectors. State employees educated at these institutions helped generate GIS interest in the state's environmental agencies.

The Hazardous Waste Facility Site Safety Council, located within the Executive Office of Environmental Affairs, and the U.S. Geological Survey's Water Resources Division initiated the first GIS activities in state government in 1985.

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The Hazardous Waste Facility Site Safety Council, located within the Executive Office of Environmental Affairs (EOEA), and the U.S. Geological Survey's (USGS) Water Resources Division (WRD) initiated the first GIS activities in state government in 1985. This effort was established to support the council's efforts to determine the most appropriate places to site hazardous waste treatment facilities, but it was soon realized that there would be additional applications of the system. The first year consisted of several feasibility studies and planning efforts. During the following three years the majority of the "MassGIS" database was constructed at WRD's offices according to a cooperative data development plan and joint funding agreement with WRD. Several small pilot projects were also conducted at this time. Digital data for surface and groundwater, roads, and existing wastes was developed at this time. In addition to this effort, the Cape Cod Management Aquifer study was also initiated in the late 1980s.

During 1987, an analysis of information technology was conducted throughout EOEA. One of the results of this effort was the report entitled *An Information Technology Plan for Managing the Environment: Building a Strategic Infrastructure*, which recommended that a GIS coordinator/planner be hired in EOEA. EOEA assumed responsibility for MassGIS early in 1989. Software was added in June on EOEA's newly installed

VAX computer; funding was provided for two staff positions dedicated to GIS efforts, and the database was migrated from WRD's computer to EOEA's Data Center.

In 1988, the Senate Special Committee on Long Range Policy Planning conducted a study of all information technology development and needs in Massachusetts. In its report, *Strategic Investments for Our Future: Building an Information Infrastructure for Massachusetts*, the committee concluded that state government should work with other public agencies and the private sector to "invest in the creation and enhancement of our information infrastructure." Strengthened horizontal and vertical information linkages were recommended, including those between agencies, and from state government to municipalities. The committee report stated that GIS services are strategic tools for planning at the state, regional and local levels; and interagency cooperation in the production and analysis of geographic data is a regulatory, economic and scientific necessity. The development of a plan to make EOEA's GIS accessible to state, regional and local agencies was one of four key initiatives recommended in the study.

During late 1988, some state agencies' representatives organized an informal geographic information coordination group. It was organized to provide a forum for the sharing of knowledge about programs and databases; to avoid the expense of creating redundant databases, determine methods and protocols for distributing digital data to all levels of government, save money on information technology and coordinate purchases, and speak with one voice to the federal government about mapping projects that impact the state.

The Office of Management Information Systems (OMIS) expressed interest in GIS during the late 1980s, including its sponsorship of GIS presentations at OMIS's annual information technology conference. After dialogue with EOEA and other agencies, OMIS's director sent a letter to state agencies in January, 1990 suggesting that the existing coordination group be formalized.

2 Coordination Efforts, Groups and Activities

GIS activities in Massachusetts are coordinated by the Massachusetts Geographic Information Committee (MGIC), which was formally organized by the Office of Management Information Systems (OMIS) in 1990. MGIC membership is open to anyone in the state. It currently has approximately 150 members, each paying $10 per year to belong to the group. An Executive Com-

mittee, elected by the membership, is composed of representatives of five state agencies, three municipalities, one state authority, three regional planning agencies (RPAs), two institutions of higher education (at least one of which is a public institution), two appointed by the legislature, and three from the private sector. State agency representatives elected in April, 1991 are from EOEA, EOEA's Department of Environmental Protection, EOEA's Metropolitan District Commission, the Division of Capital Planning and Operations, and the Executive Office of Communities and Development. Ex officio members include one each from OMIS and the Massachusetts Institute of Social and Economic Research (MISER). OMIS is responsible for information technology planning and policy, and provides related services for state agencies. MISER is responsible for the state's census data. EOEA's Assistant Secretary for Research and Data Systems has served as the chair of MGIC, and the director of the Office of Technology Planning at OMIS serves as the OMIS representative and staff member for MGIC.

MGIC adopted an *Organizational Charter of the Massachusetts Geographic Information Committee*. This charter describes the membership, goals, executive committee, subcommittees, and procedures agreed to and used by MGIC. MGIC established a policy recommendation procedure that is included in its charter. It provides that the Executive Committee will be responsible for determining policy needs and appointing subcommittees to address them. Subcommittee recommendations will then be reviewed by the executive committee, followed by review by the entire MGIC for approval. The charter provides that the State Map Advisory Committee be established, and other subcommittees can be formed by the executive committee as needed, perhaps including those which would address digital mapping, parcel mapping, aerial photography, data standards, and data distribution. MGIC's State Map Advisory Committee has the responsibility of preparing a recommended report to the U.S. Geological Survey (USGS) and other federal agencies about the state's mapping priorities. It is also addressing GIS standards, and is coordinating aerial photography.

MGIC's adopted goals, as stated in its charter, include promotion and interagency collaboration for mapping and digital cartographic data of the physical, social, and economic environment of Massachusetts by state, federal, and local governments, and by the private sector. Other goals include the provision of a forum for the formulation and promulgation of standards and conventions; technical assistance; and advising the public and private sector on mapping issues and

needs, including neighboring states and USGS.

MGIC meetings are held monthly. The initial focus of MGIC in 1990 was on information sharing and exchange. Presentations and status reports are provided at each meeting. OMIS publishes a newsletter, and has begun a special section regarding GIS. MGIC's charter also includes future goals, including providing a forum on GIS issues and activities; providing clearinghouse functions for inventories of standards, data, systems; sharing of resources; education; and public relations. A survey of hardware, software and data in state, municipal and regional agencies was conducted in 1991. After this survey is completed, MGIC will focus its efforts on development and adoption of digital data standards for statewide use. These standards will possibly be established by Executive Order.

> *GIS activities in Massachusetts are coordinated by the Massachusetts Geographic Information Committee, which was formally organized by the Office of Management Information Systems in 1990.*

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MGIC and OMIS took a lead role in submitting a grant application to the federal Economic Development Administration (EDA) in 1991, to establish a "Statewide Economic Development Planning Assistance Program in Massachusetts," but the project was not funded. The project was designed to build a program with GIS based upon the organization of important data sets from the Census Bureau, the federal Department of Commerce, the Bureau of Labor Statistics, and others. GIS would help analyze and display information to assist communities in attracting business and industry and to assist the private sector in locating new sites. The specific users of this economic development information utility would be planners in communities, regional planning agencies, and an appropriate centrally located state program established to provide assistance to business and industry seeking to locate sites necessary to their development plans. A potential outcome of the effort could be the creation of a new concept of enterprise zones defined by the occurrence of circumstances appropriate to the needs of specific business or industrial interests. Though the project was not funded by EDA, there is some likelihood that the Executive Office of Economic Affairs will fund it from state resources.

The state signed a cooperative agreement with the state of Rhode Island and its "Rhode Island

GIS" (RIGIS) in 1991. The agreement provides for RIGIS, and EOEA's "MassGIS"to "establish a formal long-term relationship" for "sharing information contained within the digital databases of each organizations' GIS." It provides that each state's GIS organization will have "open access to unrestricted data sets" of the other state, have unrestricted use of such data, refrain from distribution of such data unless authorized, and specifies that RIGIS will adhere to special conditions of the data as provided for MassGIS (see below). The agreement also provides that each state will inform the other of significant updates, additions and corrections in their respective databases; notify each other of any new projects underway using the other state's data; and provide copies of reports or maps produced using the other state's data.

Regional and Local Government Relations

EOEA has developed arrangements and memoranda of understanding (MOUs) with the state's regional planning agencies (RPAs) and municipalities (counties have few governmental powers in Massachusetts) to exchange digital data for use with GIS and provide some GIS services, sometimes in exchange for data developed by RPAs. EOEA considers the RPAs an important mechanism for the dissemination and application of environmental and geographic data to local and regional planning activities. EOEA has a statutory responsibility to assist RPAs in land use and environmental planning efforts. RPAs have traditionally fulfilled a role as technical advisors to municipalities in a wide array of planning tasks. MOUs have been signed with four of the state's 13 RPAs based on EOEA's *Digital Data Distribution Policies* (see below) and which provide for the exchange and distribution of digital data and digital data products. RPAs are able to use MassGIS data and vice versa, and "these data must be consistent with all applicable MassGIS data standards and conventions as contained in the MassGIS Data Standards document" (see below). The MOU provides for distribution of data developed by either EOEA or the RPA, and that EOEA waives 50% of all fees which it would be eligible to receive for data supplied to the RPA. RPAs agree to collect and return fees for using EOEA data for any funded projects and studies.

Policies/Standards

While Massachusetts is in the process of developing statewide standards, EOEA has developed policies and standards for its "MassGIS." *Digital Data Distribution Policies* was approved by the EOEA Information Systems Steering Committee in December 1990. This document establishes policies both in general and for those that differ by type of organization, including EOEA agencies, other state agencies, federal agencies, other states, regional planning agencies, municipalities, academic institutions, non-profit environmental organizations, and private companies and individuals. Agencies within EOEA are generally provided with unrestricted on-line access to data residing in MassGIS, providing that accounts and passwords have been established by EOEA to authorize use for specified needs. Fees as established under legislative authority are applied to other users, with flexibility allowed if data will be enhanced and provided to MassGIS, and for specified needs with limited funding resources.

MassGIS digital data users are required to sign an agreement titled *Terms and Conditions Concerning the Use of Digital Data Provided by the Massachusetts Executive Office of Environmental Affairs* when data is purchased (see **Documents Excerpts**). This agreement includes a disclaimer about the data, and states that users are not able to distribute or resell data to others without prior consent of EOEA, and that appropriate credit to EOEA must be stated on data products produced when using such data. Digital data layer costs are determined by panel size and numbers of panels. Standard and custom map and data products are also provided by EOEA for established fees.

EOEA has been developing data standards for MassGIS since 1987. Since March 1990, a draft document called *GIS Data Standards for the Executive Office of Environmental Affairs MassGIS* is used for MassGIS. This document includes data documentation and quality assurance procedures that are required before data is loaded into MassGIS for general use. It has six sections, including general cartographic factors that must be considered in any type of digital or manual project; general cartographic factors that must be considered when conducting an automated task; database requirements for the digital and attribute databases; quality control and quality assurance procedures and standards; cartographic output standards for GIS produced map products; and appendixes that include coding schemes, quadrangle names and numbers, and other information useful for projects using MassGIS. No attempt has been made to impose software or hardware standards.

GIS in State Government

Most state government GIS activities in Massachusetts are conducted within the Executive Office of Environmental Affairs (EOEA). The **Office of Management Information Systems**

(OMIS) conducts statewide information technology policy and planning work, and also provides mainframe computing services for state agencies. OMIS staffs the Massachusetts Geographic Information Committee (MGIC), which was officially established by the director of OMIS.

The **Executive Office of Environmental Affairs** (EOEA) is a comprehensive cabinet-wide office that includes most of the state's environmental and natural resources agencies. It includes the Department of Environmental Management, the Department of Environmental Protection, the Department of Fisheries, Wildlife and Environmental Law Enforcement, the Department of Food and Agriculture, the Water Resources Authority, the Metropolitan District Commission, and the Coastal Zone Management Office, among others. EOEA has an Information Systems Steering Committee which is responsible for approving all GIS activities as part of EOEA's general information technology infrastructure. EOEA's Research and Data Systems office is responsible for maintaining information technology facilities, which includes EOEA's Data Center. The cabinet-wide GIS known as "MassGIS" is located in the EOEA Data Center, and is used by the state's environmental agencies and other users such as regional planning agencies. MassGIS has been managed from this office since 1989, and originated under agreement with the U.S. Geological Survey's (USGS) Water Resources Division (WRD) Office in 1985 (see **Origins of State Initiatives**). Its facilities are also located within the WRD Office.

EOEA has a cabinet-wide GIS Committee which has been chaired by the MassGIS Manager. The committee addresses both policy and technical issues among EOEA agencies. EOEA has four staff dedicated to MassGIS. The staff is classified under the state's unique Technical Pay Law that provides competitive salaries specifically for information technology personnel. Each EOEA agency has at least three trained GIS analysts who spend an average of three-fourths of their time using the system. In total, EOEA has 33 staff members trained in GIS, who each spend over half of their time using GIS to help meet programmatic needs. Annual MassGIS expenditures are approximately $300,000, 90% of which is funded by the state, while the remainder is from fees. An additional approximately $750,000 is spent on GIS activities in EOEA's agencies.

Since June 1989, EOEA has operated ARC/INFO software on its VAX 6000-440 located at the EOEA Data Center. This implementation was a component of a larger information systems modernization effort begun in 1987. A wide area network connects the VAX with department offices in Boston, as well as some sites outside the city. Local area networks exist in individual buildings with Banyon file servers and 386-based personal computers used by individual workers. Access is provided over the EOEA wide-area-network via personal computers running TNET terminal emulation software. Each agency also maintains at least one GIS workstation in its own offices. At any given time as many as 20 separate projects may be in progress on the system. EOEA agencies also have copies of pcARC/INFO which are frequently used for data entry and editing. Oracle is used as EOEA's database management system for administration and other applications. It is used to manage the attribute data in MassGIS. Efforts are underway to convert databases running on EOEA's IBM mainframe to the VAX running Oracle. Agencies outside EOEA also access data on-line from MassGIS through a Banyon network.

EOEA has developed arrangements and memoranda of understanding with the state's regional planning agencies and municipalities (counties have few governmental powers in Massachusetts) to exchange digital data for use with GIS and provide some GIS services, sometimes in exchange for data developed by RPAs.

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Plans are under consideration to enhance MassGIS's technological infrastructure by improving connectivity with other systems, such as the U.S. Environmental Protection Agency's (EPA) Region I system, the USGS WRD system and the Massachusetts Water Resources Authority system. Each of these GIS users develop and maintain data that are of interest to EOEA, and interagency project coordination is greatly enhanced with improved connectivity. In addition, EOEA is exploring workstation technology and supplemental software as a means of improving productivity, especially for fee-for-service work. Also, several EOEA agencies have shown an interest or requirement for additional software which will allow the inclusion of satellite imagery, and advanced three-dimensional modeling capabilities which, for example, would assist in pollution dispersal modeling.

Currently, MassGIS staff perform five primary functions:

- Management of system software.
- Maintenance, expansion and administration of the core database.
- Delivery of cartographic production and analytic services to the secretary's office.
- Provision of training, project evaluation and technical assistance to agency end users.
- Management and implementation of data distribution to other agencies and the private sector on a cost recovery basis.

MassGIS digital data users are required to sign an agreement titled **Terms and Conditions Concerning the Use of Digital Data Provided by the Massachusetts Executive Office of Environmental Affairs** *when data is purchased.*

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EOEA training, data and GIS services are provided to other state agencies, regional planning agencies, and municipalities. MassGIS staff developed and have conducted a two-week training course that is designed for EOEA staff. For example, 14 EOEA staff workers attended the training in October 1989, and an additional 16 staff workers were trained in September 1990. The MassGIS formerly published a newsletter, but it was discontinued due to budget restrictions.

MassGIS data and services are described in the document entitled *MassGIS Datalayer Descriptions and a Guide to User Services*, published in December, 1990. The Massachusetts Public Records Law provides that data is available unless statutorily restricted. Regulations promulgated from it permit EOEA to establish a fee schedule and charge fees for digital cartographic and other data. Fees support staff time, equipment maintenance and supplies. Digital data layer costs are determined by panel size and numbers of panels. Standard and custom map and data products are also provided by EOEA for established fees. Terms and conditions are established for use of Mass-GIS data, including an agreement for users to sign about use of the data (see **Coordination Efforts, Groups and Activities**, Policies/Standards). During 1990, MassGIS generated $122,800 in retained revenue. It is predicted that the revenue potential is much greater, but some concern is being given to meeting internal needs as opposed to serving external intenrests on a fee-for-services basis. In addition to these fees for service, EOEA has signed memoranda of understanding with four of the state's 13 regional planning agencies to provide for data exchange. These agreements provide that EOEA will waive half of all fees if data sharing arrangements exist (see **Coordination Efforts, Groups and Activities**, Regional and Local Government Relations).

EOEA and OMIS are discussing the possibility of developing data products similar to the State of Minnesota's DataNet Plus (TM) which provides standardized digital cartographic products on a subscription basis. The state is also considering the needs of state agencies that may not need their own GIS facilities, and OMIS or EOEA may provide service bureau functions for them.

The MassGIS database is currently over 1.8 gigabytes in size. This database consists of a variety of statewide data layers of key environmental information, much of which is uniquely constructed from base maps at the 1:25,000 scale or better. The database includes the state's 189 quadrangles, political boundaries, protected open space, public water supplies, watersheds, and some elevation data. Other data sets include transportation and hydrography from the 1:100,000 scale USGS DLGs, aquifers from USGS at 1:48,000, and suficial geology at 1:125,000, also from USGS. EOEA also has Census TIGER data. MassGIS stores not only the location of these data, but also extensive attribute information. For example, public water supplies data includes well descriptions, such as well name, water company, and quantity pumped from the well.

Various data development efforts are underway. Massachusetts wanted to participate with USGS in the National Aerial Photography Program (NAPP). EOEA is the lead agency in the cooperative agreement with nine other state, federal, academic and private entities that contributed to fund the state's half ($31,000) of the cost of the project. In addition, efforts are underway in the Department of Environmental Protection to create 1:5,000 scale orthophotos for wetlands mapping (see below for DEP). MassGIS plans to use this data as a new base map to replace the 1:25,000 USGS topographic quadrangles. Movement to the higher resolution orthophotos as a base map will allow mapping accuracy to improve from +/-100 feet to potentially +/-10 feet. A 1991 land use data layer is under development by the University of Massachusetts at Amherst through a $400,000 contract with EOEA to replace the current 1985 land use data. This data will be useful for a variety of EOEA and other agency needs, including agriculture and wetlands, as well as regional and local needs. Another initiative is completion of elevation data for the entire state.

MassGIS has become a basic tool applied by all of the environmental agencies for meeting their

responsibilities. Multi-state activities are also underway. In response to a request posed at the New England Governors' Conference in December 1989, MassGIS participated with the states of Connecticut, New Hampshire, Rhode Island and Vermont in the Connecticut River Open Space Project. The states used GIS and related data to produce a composite map, with processing work conducted by the University of New Hampshire, and output by MassGIS's electrostatic plotter (see New Hampshire profile).

The **Department of Environmental Protection** (DEP) is responsible for enforcing environmental regulations in Massachusetts. It is the largest GIS user of the EOEA agencies. DEP has a full-time GIS coordinator, and other staff members are also working full-time on GIS for program needs.

The **Division of Water Supply** is one of DEP's largest GIS user divisions. One of its largest projects is the Water Supply Contamination Correction Program, which undertook a GIS project that assesses the potential impacts to groundwater quality posed by underground storage tanks (USTs). Tanks near public water supplies were identified and are prioritized by the program for inspection, action or special monitoring. The project also developed an on-line application whereby analysts can browse through a computerized listing of UST's, and upon finding a tank of interest or concern, can have a map drawn on the screen to assess potential impacts to natural resources. GIS are also used to help determine well head protection zones.

The **Division of Wetlands and Waterways'** Wetlands Conservancy Program is conducting one of the largest efforts in DEP related to digital data development for GIS. It is currently using 1:12,000 scale infrared photography to identify wetlands. DEP is also in the process of producing statewide 1:5,000 scale orthophotography to help identify wetlands. GIS services are used to help identify which property owners have wetlands that are to be restricted.

The **Division of Air Quality Control** has developed an application whereby a user can easily gather land use information for areas near a facility that is going through the permit approval process. This land use information can help an analyst understand the general setting of a proposed permit, and can also be fed to air quality models which can help predict emissions dispersal based on this and other data.

The **Department of Environmental Management** (DEM) has one staff person working full-time with GIS. Various divisions are working with MassGIS. The system is used in the Area of Critical Environmental Concern (ACEC) Program for

river basin management planning, and to identify hazardous waste generators. The MassGIS database has been employed by DEM to help evaluate areas proposed for designation as an ACEC, and to help determine the ultimate boundary of the ACEC. Maps produced through the use of GIS have been important tools used at public meetings throughout the process.

EOEA's **Coastal Zone Management** (CZM) Office is considered to be a networking agency within EOEA to ensure proper management of the coastal zone. GIS are used for land use planning purposes and in the Area of Critical Environmental Concern (ACEC) Program for coastal areas. The largest current GIS effort is for the Massachusetts Bay Program and the Buzzards Bay Program Bays Program, with funding from U.S. EPA. Each program has a staff person dedicated for GIS to meet program needs. This effort requires that intensive efforts be undertaken to measure and understand the sources of pollutants affecting marine water quality. GIS are assisting in the development of management plans to be implemented in the communities surrounding those bays.

MassGIS public water supplies data includes well descriptions, such as well name, water company, and quantity pumped from the well.

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CZM is working with EOEA and other agencies to develop the Marine Coastal Information System. A feasibility study was conducted in 1989 to determine the feasibility of using the system as a filter through which data from various other EOEA systems can be accessed as needed for coastal purposes. Plans are also under discussion to add nautical charts to MassGIS, which could then be used with electronic charting.

Massachusetts is participating with the National Oceanic and Atmospheric Administration's Office of Coastal Resources Management, U.S. EPA and various neighboring states and provinces and federal agencies in Canada in efforts to improve conditions in the Gulf of Maine. CZM chairs the Gulf of Maine Data and Information Management Committee. During early 1991, the committee began a users needs assessment effort of all participating entities, and initiated compilation of databases about existing databases. The similar Narragansett Bay project in Rhode Island and the efforts of the Arctic Environmental Data Directory Working Group from Alaska are being used

as potential models in this effort (see profiles for Rhode Island and Alaska).

The **Department of Fisheries, Wildlife and Environmental Law Enforcement** (DFWELE) has been using GIS in-house since July 1989, with pcARC/INFO on a 386 personal computer in addition to using MassGIS. DFWELE is conducting a variety of data development efforts, including marine boundaries and identifying which water bodies in Massachusetts are used by anadromous (salt water fish that spawn in fresh water) and catadromous (fresh water fish that spawn in salt water) fish. These data support fisheries biologists attempting to protect these water bodies from development or degradation. GIS are also used to support environmental enforcement mapping by showing the distribution of citations by the Environmental Police. The results of this assessment can support deployment efforts with the limited staff resources.

Efforts are underway in the Department of Environmental Protection to create 1:5,000 scale orthophotos for wetlands mapping.

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Four environmental agencies in EOEA are responsible for protecting a total of over a half-million acres of open-space conservation land. An effort is underway to map lands owned by state, federal, and local agencies, and non-profit organizations. DFWELE has used this data layer extensively with GIS to support its protected open space acquisition program. Counties and towns are participating in this effort to compare local maps with the state's 1:25,000 series maps. DFWELE is using its portion of the state's open-space bond by protecting river corridors and connecting existing open-space parcels into larger parcels. GIS was used to identify these potential areas and to show existing holdings.

EOEA's **Massachusetts Water Resources Authority** (MWRA) was created in 1985 to modernize water and wastewater services in the Boston metropolitan area. It includes 57 Boston area cities and towns as its members, with a board of directors selected by the legislature. MWRA is responsible for providing wastewater services in the Boston area, and has primary responsibility for the delivery and distribution of water to 46 communities located throughout the state. It is also charged with leading the clean-up of Boston Harbor. GIS was initiated to manage information about these facilities and to monitor pollution levels in the harbor.

The Water Authority has the second largest GIS in EOEA, with ARC/INFO operating on a VAX 6220. GIS is used to link MWRA's tabular databases using Oracle. A *GIS User Needs Assessment and Conceptual Data Base Design* was prepared in December, 1989. It is now used for watershed control and planning, protection of local water source supplies, Boston Harbor water quality monitoring and cleanup, drought planning, facilities mapping, and attribute development. GIS helped produce MWRA's federally mandated watershed management plan, and it is planned for use in order to help develop the Safe Drinking Water Act Compliance Plan.

MassGIS was contracted by the MWRA to model the potential impacts of new watershed protection legislation on communities in watersheds. This new legislation, proposed by Rep. David Cohen, would require that GIS be used to help protect lands within 200 feet of tributaries of the Quabbin, Wachusett and Ware Rivers Watershed to protect water supplies and would restrict development within 400 feet of the tributaries. MassGIS identified all areas impacted by the proposed legislation and then quantified how much land was impacted in each town, accounting for already protected and already developed lands.

EOEA's **Metropolitan District Commission** (MDC) is using GIS for a variety of applications, including watershed management in the Watershed Division, which has automated much of the information they compile on the status of monitoring in the watershed. MDC has also worked closely with the MWRA in developing a Watershed Management Plan which has used GIS data extensively. MDC is also responsible for managing reservations, roadways, zoos, and skating rinks. MDC uses GIS to help manage these facilities and plan for their maintenance, including development of an automated system-wide facility inventory.

EOEA's **Department of Food and Agriculture** is using MassGIS facilities, but plans to purchase its own equipment. The agency uses GIS to calculate agricultural acreage that potentially impacts public water supply. The Pesticides Regulations Board assessed the impacts of new regulations using GIS prior to promulgation of the regulations.

The Department of Administration's Division of Capital Planning and Operations' **Office of Real Estate Redevelopment** has a GIS-based, statewide real estate asset management system called MAssetts (Massachusetts Asset Management System). This system supports analysis and decision making regarding the acquisition, use and disposition of state land and buildings, and helps to maintain an inventory of real property owned by the state. Initially developed with a pilot project in Hampden County, it is used for facility siting,

reuse and redevelopment, and legal and administrative issues. MAssetts is composed of information on the entire real property portfolio of the commonwealth, containing approximately 450,000 acres of land and 75,000,000 square feet of structures in 351 communities and 170 agencies, including land parcel and land improvements database inventories. The system is expanding with more interaction within regional and local governments. They have a network of SUNs using workstation ARC/INFO.

The **Massachusetts Historical Commission** is responsible for identifying and protecting the commonwealth's historic and prehistoric resources, which will become part of a statewide inventory and may be nominated to the National Register of Historic Places. This inventory is known as the Massachusetts Cultural Resource Information System (MACRIS), and is being used with pcARC/INFO on an IBM AT computer. An agreement was prepared between MassGIS and the Commission whereby MassGIS provides its base map, and the commission maintains and regularly updates locations of historic properties on a data layer that is available to other MassGIS users. The State Register of Historic Places will be completed in early 1992.

The **Executive Office of Communities and Development** is considering use of GIS for siting of housing and environmental review practices. Its Department of Planning and Community Development uses GIS for comprehensive community planning; assessment of the effects of zoning bylaw changes or of the need for changes; responses to inquiries about property or persons; and evaluation of externally developed descriptions of towns.

The **Executive Office of Transportation and Construction** (EOTC) is coordinating GIS activities in its agencies. Its **Central Transportation Planning Staff** recently completed a feasibility study to create a transportation planning GIS expertise, and will be developing an agency-wide GIS beyond its currently used AutoCAD system. EOTC's **Department of Public Works** (DPW) is the state's department of transportation. It has been using McDonnell Douglas' Graphic Design System on a VAX since 1987 for internal needs. Its main GIS application is the Central Artery Project in Boston which is a $4.9 billion, ten-year multi-disciplinary design and construction effort. The project is being directed by DPW and EOTC, with 90% of its funding from the Federal Highway Trust Fund. It includes a widened and depressed central artery, a depressed seaport access road, and a third harbor tunnel. One integrated automation program was developed for project management, architecture, engineering, and con-

struction, including Intergraph and McDonnell Douglas systems. In addition, DPWA helped fund the state land use data layer in MassGIS.

Academic Activities

The **University of Massachusetts** at Amherst was an early user of GIS technology. It has assisted MassGIS in the development of key statewide data layers including land use and environmental open space. It is currently under contract with EOEA to develop a 1991 land use data layer to replace the current 1985 land use data. Interpretation of some of the photography is underway. The Boston campus also uses GIS and has an agreement with the Metropolitan Area Planning Council to assist in its GIS development efforts. **Massachusetts Institute of Technology** has extensive GIS facilities, and is an active participant in MGIC activities. Other academic institutions in Massachusetts also have GIS facilities and education programs.

Documents List

Directive

Massachusetts General Laws 21A and Chapter 240 of the Acts of 1989, Section 2C, line 2001-1001.

This section in the statute authorizes the Executive Office of Environmental Affairs to render "data processing services to state agencies, authorities and units of government within the Commonwealth" and to distribute "digital cartographic and other data." The fee schedule for the distribution of digital data and digital data products was established in Chapter 653, section 138, of the *Budget Control and Reform Act of 1989*.

Legislative Report Strategic Investments for Our Future: Building an Information Infrastructure for Massachusetts, Report of the Senate Special Committee on Long-Range Policy Planning, June, 1988.

This report details the conclusions of the Senate Special Committee on Long-Range Policy Planning that investigated all information technology development and needs in Massachusetts. The committee concluded that state government has a "major new role to play in technology assessment, development and application . . . the public and private sectors must invest in the creation and enhancement of our information infrastructure." Strengthened horizontal and vertical information linkages were recommended, including those between agencies and from state government to municipalities. The committee identified GIS as a strategic tool for planning at the state, regional

and local levels and concluded that interagency cooperation in the production and analysis of geographic data is a regulatory, economic and scientific necessity. The development of a plan to make the Executive Office of Environmental Affairs' GIS accessible to state, regional and local agencies was one of four key initiatives recommended in the study.

Agreements

Terms and Conditions Concerning the Use of Digital Data Provided by the Massachusetts Executive Office of Environmental Affairs, Executive Office of Environmental Affairs, December, 1990.

GIS helped produce Massachusetts Water Resources Authority's federally mandated watershed management plan, and it is planned for use in order to help develop the Safe Drinking Water Act Compliance Plan.

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This agreement establishes the authority, justification and purpose of the Executive Office of Environmental Affairs' (EOEA) terms and conditions related to the use of digital data. It establishes that users are not to distribute or resell data to others without prior consent of EOEA, and that appropriate credit to EOEA must be stated on data products produced when using such data. Users are required to sign this agreement at the time of purchasing data from EOEA (see **Document Excerpts**).

Memorandum of Understanding Between the Massachusetts Executive Office of Environmental Affairs and the Central Massachusetts Regional Planning Commission Concerning the distribution of digital data and digital data products, 1990.

This Memorandum of Understanding is an example of an MOU between the Executive Office of Environmental Affairs (EOEA) and Regional Planning Commissions (RPAs) concerning the use, exchange and distribution of digital data and digital data products. The MOU includes provisions from EOEA's *Digital Data Distributions Policies*. It provides that EOEA will make MassGIS data available to the RPA upon request, and that the RPA can "use these data in studies and projects which it conducts or causes to have conducted on its behalf." It also provides that the RPA "shall make available to EOEA all digital data that it develops in the various GIS studies

and projects which it undertakes, [and] [t]hese data must be consistent with all applicable MassGIS data standards and conventions as contained in the MassGIS Data Standards document." The MOU also provides for distribution of data developed by either EOEA or the RPA, including the stipulation that EOEA may use and distribute data that are enhancements of existing MassGIS data layers, and that new data developed by the RPA may be used by EOEA for its own purposes, but cannot distribute such data to other users. EOEA waives 50% of all fees which it would be eligible to receive for data supplied to the RPA, and the RPA agrees that it will collect and return these fees to EOEA for all funded projects and studies that it undertakes and which require the use of data provided by EOEA under this agreement.

Charter

Organizational Charter of the Massachusetts Geographic Information Committee, Massachusetts Geographic Information Committee, December, 1990.

This charter describes the composition, goals, subcommittees, and policy recommendation procedures agreed to and used by the Massachusetts Geographic Information Committee. It states that membership is open to representatives from all levels of government and the private sector, and voting members shall are defined as those "who have paid annual dues in an amount set each year by the Committee of the whole." An Executive Committee, elected annually from the membership, includes six state agencies; four municipalities; two state authorities; three regional planning agencies or counties; two institutions of higher education (at least one of which shall be a public institution); two representatives appointed by the legislature; and three representatives from the private sector. Ex officio members include one each from the Office of Management Information Systems (OMIS) and the Massachusetts Institute of Social and Economic Research (MISER), which is responsible for the state's census data. The charter provides that a permanent subcommittee called the State Map Advisory Committee be established and other subcommittees can be formed by the Executive Committee as needed. It also states general and specific goals to be established for 1991 including a forum on GIS issues and activities, providing clearinghouse functions which include inventories of standards, data, systems, sharing of resources, and education and public relations. A policy recommendations procedure is also included. The charter includes all approved amendments voted on during the 1990 calendar year.

Policies/Standards

Digital Data Distribution Policies, Massachusetts Executive Office of Environmental Affairs, December 13, 1990.

This document includes policies established by the Massachusetts Executive Office of Environmental Affairs' Information System Steering Committee. It establishes policies both in general and those that differ by type of organization, including EOEA agencies, other state agencies, federal agencies, other states, regional planning agencies, municipalities, academic institutions, non-profit environmental organizations, and private companies and individuals. Agencies within EOEA are "in general . . . provided with unrestricted on-line access to data residing in Mass-GIS," providing that accounts and passwords have been established by EOEA to authorize use for specified needs. Fees established under legislative authority are applied to other users, with flexibility allowed if data is to be enhanced and provided to MassGIS, and for specified needs with limited funding resources (see **Document Excerpts**).

GIS Data Standards for the Executive Office of Environmental Affairs MassGIS, Massachusetts Executive Office of Environmental Affairs, DRAFT March, 1990.

This document includes draft standards for data developers and users of the Executive Office of Environmental Affairs' MassGIS. These standards were established to help meet the goals of providing a "high-quality and well-documented database" through "direct documentation of the data and quality assurance procedures that insure data is thoroughly checked for accuracy/dependability before being loaded into the system for general use."The document has six sections, including general cartographic factors that must be considered in any type of digital or manual project; general cartographic factors that must be considered when conducting an automated task; database requirements for the digital and attribute databases; quality control and quality assurance procedures and standards; cartographic output standards for GIS-produced map products; and appendixes including coding schemes, quadrangle names and numbers; and other information useful for projects using MassGIS.

Reports/Publications

MassGIS Datalayer Descriptions and a Guide to User Services, Massachusetts GIS, Executive Office of Environmental Affairs, December, 1990.

This document provides an overview of the Executive Office of Environmental Affairs' (EOEA) GIS, known as "MassGIS," including datalayer descriptions; services and fees; a purchasing agreement and order form for digital data; 1:25,000 quadrangle names and numbers; and Massachusetts community codes. Datalayer descriptions for 16 layers include an overview, and information about scale, size, number of panels, source, production, attributes, annotation, checkplot and editing, future enhancements, maintenance, and fees. Information about services and fees for standard map plots, custom map plots and data products, and plots from user-supplied plotfiles is included. Terms and conditions concerning the use of digital data are provided in an agreement to be signed by when purchasing data (see above).

GIS User Needs Assessment, Massachusetts Water Resources Authority, Camp, Dresser & McKee, Inc., December, 1989.

This assessment and database design was prepared for the Massachusetts Water Resources Authority before their acquisition of GIS software. It includes a review of data elements and potential GIS applications.

Massachusetts Executive Office of Environmental Affairs: Marine Coastal Information System: Phase I Feasibility Study, McDonnell Douglas Information Systems Company, August 25, 1989.

This study was conducted to determine the feasibility of developing a Marine Coastal Information System as part of the Executive Office of Environmental Affairs (EOEA)'s efforts to implement systems modernization. The system would act as a filter through which data from various other EOEA systems can be accessed as needed for coastal purposes. The study outlines how databases would be converted to run with GIS.

An Information Technology Plan for Managing the Environment: Building a Strategic Infrastructure, Hayes-Mechling-Kleiman, Inc., for the Massachusetts Executive Office of Environmental Affairs, June, 1987.

The Pesticides Regulations Board assessed the impacts of new regulations using GIS prior to promulgation of the regulations.

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This document is a cabinet-wide analysis and contains recommendations for information technology in the Executive Office of Environmental Affairs. While broader than GIS, it recommends that GIS be included within the cabinet's plans and that its staff be hired to coordinate GIS activities.

Paper

GIS and the Central Artery/Tunnel Project, (Massachusetts) van der Schaaf, Frits, Art Schintzel, and Cliff Petersohn, March, 1991.

This paper reviews the Central Artery/Tunnel project in Boston, which is a $4.9 billion, ten-year multi-disciplinary design and construction effort. The project is being directed by the Department of Public Works and the Executive Office of Transportation and Construction, of which 90% is funded through the Federal Highway Trust Fund. One integrated automation program was developed for project management, architecture, engineering, and construction. The paper reviews technical aspects of the spatial framework, base mapping, utilities inventory, three dimensional modeling, attribute databases, standards, specifications, quality control and assurance procedures, applications, and the multi-vendor environment being used for GIS applications.

Document Excerpts

MASSACHUSETTS
EXECUTIVE OFFICE OF
ENVIRONMENTAL AFFAIRS (EOEA)
DIGITAL DATA DISTRIBUTION POLICIES

(Adopted by EOEA Information Systems Steering Committee on December 13, 1990.)

EOEA administers, supervises, coordinates, and funds a variety of regulatory and management programs that are important to the environmental resources of the Commonwealth. In keeping with M.G.L. c.21A which charges EOEA with responsibility for developing "data management capabilities" and acting "as a clearinghouse for environmental information, data and other materials," EOEA manages the Environmental Affairs Data Center, the MassGIS and several other environmental information system units that support its information management needs. It is the policy of EOEA to provide to its agencies, and other agencies, authorities, units of government, organizations and companies within the Commonwealth access to data and data processing services which will enhance the quality of environmental regulatory, management and resource decisions. It is the expressed intent of the Massachusetts General Court that EOEA should recover some of the costs associated with the maintenance, provision and distribution of data and data procession services.

It is the intent of this policy document to lay out the manifestations of this general policy as they pertain to the various types of organizations to which EOEA is authorized to extend access to digital data.

Authority

The legal authority for EOEA to enter into the distribution of digital data and digital data products is M.G.L. c.21A and Chapter 240 of the Acts of 1989, Section 2C, line 2001-1001 and any similar budget document wherein the language is substantially the same as that in line 2001-1001 of said Chapter 240 wherein EOEA is authorized to render "data processing services to state agencies, authorities and units of government within the Commonwealth" and to distribute "digital cartographic and other data."

The fee schedule for the distribution of digital data and digital data products, as established in Chapter 653, section 138, of the "Budget Control and Reform Act of 1989," is attached hereto.

General Terms and Conditions

The following terms and conditions apply to all users of data supplied by EOEA unless specific exemptions are made in writing through such documents as Interagency Service Agreements, Memoranda of Understanding or other contractual vehicles.

Data provided are intended for the sole use of the purchasing agency, organization or company. They are not to be distributed or resold to other agencies, organizations or individuals without the prior expressed, written consent of EOEA. Data may be enhanced, analyzed, manipulated or output by the duly authorized agents of the purchasing agency, organization or company but only for the purposes of the purchasing agency, organization or company.

All maps or other documents produced using data or data products supplied through this agreement must contain a data source credit, prominently displayed, such as "source data supplied by the Massachusetts Executive Office of Environmental Affairs, MassGIS."

EOEA requires that in the use of these data that the purchasing agency, organization or individual employ, attach or release a statement which includes the following:

"These digital data represent the efforts of the Massachusetts Executive Office of Environmental Affairs and its agencies to record information from the cited source materials. (Examine the documentation file for a description of the source material.) EOEA maintains an ongoing program to record and correct errors in these data that are brought to its attention. EOEA makes no claims as to the validity or reliability or to any implied uses of these data. EOEA maintains records regarding all methods used to collect and process these digital data and will disclose this information upon request."

Policies Pertaining to Specific Types of Organizations

Massachusetts Environmental Agencies

In general, agencies within the Executive Office of Environmental Affairs are provided with unrestricted on-line access to data residing in MassGIS and other general use databases (unrestricted by regulation or statute) provided that users have been assigned accounts and passwords allowing them to access such data in accordance with existing project, application or user approval requirements. MassGIS and the EOEA Data Center will also provide copies of data files to authorized users who do not have on-line access to central databases.

EOEA agencies may not redistribute digital data files from MassGIS or other similar central databases to external users without the prior expressed, written consent of EOEA. To the extent that an agency is authorized to make available to external users copies of data files, mailing lists, computer generated maps, etc., and approved fees exist for those data or data products, it is the agency responsibility to see that the appropriate fee is charged and the required portion deposited to the EOEA Data Center Retained Revenue account. Failure to adhere to these policies will result in the loss of user privileges.

State Agencies and Authorities, Federal Agencies and Other States

It is the policy of EOEA to apply the legislatively approved fee schedule to distribution of digital data and digital data products for requests for agencies (other than those within

the Executive Office of Environmental Affairs), authorities, federal agencies and other states. The several exceptions to this policy are as follows:

EOEA is willing to supply data to an agency if the agency enhances that specific data set (applying all appropriate EOEA data standards) in some substantive manner of value to data users within EOEA and returns the enhanced data set to EOEA. Agreement concerning exchange of data under this policy will generally allow EOEA to redistribute the enhanced data through its legislatively approved fee schedule.

EOEA is willing to enter into long-term data exchange agreements with other agencies that are undertaking the development and maintenance of large databases of use to EOEA data users. Such agreements may include waivers of all fees normally applied to such data distribution activities (as specified by the legislatively approved fee schedule) or partial waiver of fees, whichever is more appropriate to the specific circumstance.

EOEA is willing, under some circumstances, to provide digital data to other state agencies for single uses at a reduced fee provided that the results and ½or methods of the intended use are made available to EOEA.

Regional Planning Agencies

EOEA views RPAs as an important mechanism for the dissemination and application of high-quality environmental/geographic data to local and regional planning activities. RPAs have traditionally fulfilled a role as high-quality technical assistance providers in a wide array of planning tasks. EOEA has a statutory responsibility to assist RPAs (M.G.L. c. 21A s. 2) in land use and environmental planning efforts. Data distribution policies formulated in this document are an extension to this basic responsibility.

All policies listed under the State Agency section of this document are applicable to RPAs.

EOEA is willing to enter into agreements with RPAs whereby an RPA may be provided with a copy of all data for its region from the MassGIS database for use under the above General Terms and Conditions if the RPA agrees to implement a set of user fees for all funded projects and studies to which the data are applied and return those fees to the EOEA Data Center Retained Revenue account in an amount not to exceed the fees which would have been applied under the legislatively approved fee schedule.

Municipalities

All policies listed under the State Agency section of this document are applicable to municipalities.

EOEA will make available to municipalities in the Commonwealth a composite data set containing all data for that municipality contained in the MassGIS database at a single fee which will be lower than the cost of obtaining all the individual data coverages at the legislatively approved fee schedule.

Academic Institutions

All policies listed under the State Agency and Authority section of this document are applicable to Public Institutions of Higher Education within the Commonwealth.

EOEA will make available to colleges and universities within the Commonwealth a limited number of data sets for limited geographic areas for use in educational activities and unsponsored projects and research activities. If those same data are then applied to a sponsored project, studio or research activity it is expected that the institution will then return to EOEA the fees for those data according to the legislatively approved fee schedule.

EOEA will accept research and public service proposals from Academic Institutions requesting "grants" of data which are necessary to the completion of funded projects but for which funds are not available to acquire data according to the legislatively approved fee schedule. The research or public service must be concerned with the environmental resources of the Commonwealth and of interest to EOEA and its agencies. A "grant" of data will require that EOEA be listed as a co-sponsor of the project at an amount equal to the fees that would have been applied according to the legislatively approved fee schedule. Such "grants" from EOEA may be used as matching funds for the purposes of securing funds from other sponsoring agencies.

Non-Profit Environmental Organizations

All policies listed under the State Agency and Authority and the Academic Institutions sections of this document are applicable to non-profit environmental organizations within the Commonwealth.

Private Companies and Individuals

It is the policy of EOEA to apply the legislatively approved fee schedule to distribution of digital data and digital data products to requests from private companies and individuals.

EOEA is willing to supply a data set to a company or individual if they enhance that specific data set (applying all appropriate EOEA data standards) in some substantive manner of value to data users within EOEA and return the enhanced data set to EOEA. Agreement concerning exchange of data under this policy will generally allow EOEA to redistribute the enhanced data through its legislatively approved fee schedule.

AGREEMENT
TERMS AND CONDITIONS CONCERNING THE USE OF DIGITAL DATA PROVIDED BY THE MASSACHUSETTS EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

This Agreement specifies the terms and conditions under which digital data and/or digital data products provided by the *Massachusetts Executive Office of Environmental Affairs (herein EOEA), located at 100 Cambridge Street, Suite 2000, Boston, MA 02202*, may be used.

Authority

The legal authority for EOEA to recover and retain fees for the distribution of data under the following terms and conditions *M.G.L. c.21A and Chapter 240 of the Acts of 1989, Section 2C, line 2001-1001 and any similar budget document wherein the language is substantially the same as that in line 2001-1001 of said chapter 240 wherein EOEA is authorized to render "data processing services to state agencies, authorities and units of government within the Commonwealth" and to distribute "digital cartographic and other data."*

The fee schedule for the distribution of digital data and digital data products is established in *Chapter 653, section 138, of the "Budget Control and Reform Act of 1989".*

Justification and Purpose

EOEA administers, supervises, coordinates, and funds a variety of regulatory and management programs that are important to the environmental resources of the Commonwealth. In keeping with M.G.L. c.21A which charges EOEA with responsibility for developing "data management capabilities" and acting "as a clearinghouse for environmental information, data and other materials, EOEA manages the Environmental Affairs Data Center, the MassGIS and several other environmental information system units that support its information management needs. It is the policy of EOEA to provide to its agencies, and other agencies, authorities, units of government, organizations and companies within the Commonwealth access to data and data processing services which will enhance the quality of environmental regulatory, management and resource decisions. It is the

expressed intent of the Massachusetts General Court that EOEA should recover some of the costs associated with the maintenance, provision and distribution of data and data procession services.

Use of Date Provided Under this Agreement

Data provided under this Agreement are intended for the sole use of the purchasing agency, organization or individual. They are not to be distributed or resold to other agencies, organizations or individuals without the prior expressed, written consent of EOEA. Data may be enhanced, analyzed, manipulated or output by the duly authorized agents of the purchasing agency or organization but *only* for the *purposes* of the purchasing agency or organization.

All maps or other documents produced using data or data products supplied through this agreement must contain a data source credit, prominently displayed, such as "source data supplied by the Massachusetts Executive Office of Environmental Affairs, MassGIS."

EOEA requires that in the use of these data that the purchasing agency, organization or individual employ, attach or release a statement which includes the following.

"These digital data represent the efforts of the Massachusetts Executive Office of Environmental Affairs and its agencies to record information from the cited source materials. (Examine the documentation file for a description of the source material.) EOEA maintains an ongoing program to record and correct errors in these data that are brought to its attention. EOEA makes no claims as to the validity or reliability or to any implied uses of these data. EOEA maintains records regarding all methods used to collect and process these digital data and will disclose this information upon request."